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10/591,939	09/07/2006	Alexandros Tourapis	PU040073	4600

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Robert D. Shedd, Patent Operations
THOMSON Licensing LLC
P.O. Box 5312
Princeton, NJ 08543-5312

EXAMINER	
WILLIAMS, JEFFERY	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/591,939	TOURAPIS ET AL.	
	Examiner	Art Unit	
	JEFFERY WILLIAMS	4163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1,2, 5-13, 17-29, 31-41, 43,and 44 are rejected under 35 U.S.C. 102 (a) as being anticipated by Weigand (Overview of the H.264/AVC Video Coding Standard, IEEE vol. 13, no. 7).

Regarding claim 1, Weigand discloses a video encoder for encoding video signal data for an image slice comprising:

a slice prediction residual downsampler (the downsampling is interpreted as "selectively" discarding the high frequencies of the prediction residual) adapted for selective (the term "selective" is interpreted as meaning able to reject frequencies other than the one selected or tuned (definition taken from thefreedictionary.com)) coupling with the input of a transformer (see pg. 562 "Hierarchical block transform". The block transform uses the low frequency chroma information);

a quantizer coupled with the output of the transformer (see pg. 567 Fig. 8); and

an entropy coder coupled with the output of the quantizer (see pg. 567 Fig. 8) ,

wherein the slice prediction residual downsampler is used to downsample a prediction residual of at least a portion of the image slice prior to transformation and quantization of the prediction residual (the downsampling is interpreted as "selectively" discarding the high frequencies of the prediction residual).

Regarding claim 2, Weigand discloses the video encoder as defined in claim 1, wherein the image slice comprises video data in compliance with the International Telecommunication Union, Telecommunication Sector (ITU-T) H.264 standard (see pg. 565 para. D. sentence 4-5; "A picture is therefore a collection of one or more slices in H.264/AVC).

According to Fig. 8, the prediction residual, which is predicted using one of nine intra prediction modes from Fig. 11, in this case mode 0 or 1, is downsampled by the hierarchical block transformer which discards the high frequencies of the prediction residual.

Regarding claim 5, Weigand discloses the video encoder as defined in claim 1, wherein the image slice is divided into image blocks (566 Figs. 6 and 7 and para. 1 and 2), and a prediction residual is formed subsequent to an intra prediction for the image blocks (see pg. 566 "I slice" bullet and pg. 568 section G. Intra frame prediction). The forming of a prediction residual subsequent to an intra prediction for the image blocks is an inherent feature of intra-frame prediction.

Regarding claim 6, Weigand discloses the video encoder as defined in claim 5, wherein the intraprediction is performed using one of 8x8 and 32x32 prediction modes (see pg. 569 Fig. 12).

Regarding claim 7, Weigand discloses the video encoder as defined in claim 1, wherein the image slice is divided into image blocks, and a prediction residual is formed subsequent to an inter prediction for the image blocks (see pg. 569 section H. inter-Frame Prediction, sentences 3-6 and para. 2).

Regarding claim 8, Weigand discloses the video encoder as defined in claim 1, wherein the slice prediction residual downsampler applies a downsampling operation to only one of a horizontal direction and a vertical direction of the prediction residual (see pg. 568 Fig. 11).

Regarding claim 9, Weigand discloses the video encoder as defined in claim 1, wherein the image slice is divided into macroblocks (see pg. 9, ln. 9), and a reference index coded for an individual macroblock corresponds to whether the prediction residual for that individual macroblock will be downsampled (see pg. 568 section G. Intra-Frame Prediction, I_PCM coding type allows encoder to simply bypass the prediction and transform coding). In the reference, the downsampling is performed as a part of the transform. Therefore, by bypassing the transform, downsampling is also being bypassed.

Regarding claim 10, Weigand discloses the video encoder as defined in claim 1, wherein the video signal data corresponds to an interlaced picture (see pg. 566 section F. adaptive Frame/Field Coding Operation), the image slice is divided into image blocks (see pg. 566 Fig. 7), and the slice prediction residual downsampler downsamples the prediction residual in one of a same mode as a current one of the coded image blocks, the same mode being one of a field mode and a frame mode (see pg. 566 section F. adaptive Frame/Field Coding Operation, numbers 1) and 2)).

Regarding claim 11, Weigand discloses a video encoder for encoding video signal data for an image, the video encoder comprising:

macroblock ordering means for arranging macroblocks corresponding to the image into at least two slice groups (see pg. 566 para. 1 and 2, Flexible macroblock ordering (FMO); and

a slice prediction residual downsampler for downsampling a prediction residual of at least a portion of an image slice prior to transformation and quantization of the prediction residual (see pg. 562 "Hierarchical block transform". The block transform uses the low frequency chroma information),

wherein said slice prediction residual downsampler is utilized to receive at least one of the slice groups for downsampling (see pg. 567 Fig. 8).

Regarding claims 12, 13, 15, and 17-22, Weigand discloses "one of the key benefits provided by a standard is the assurance that all the decoders compliant with the standard will be able to decode a compliant compressed video" (see pg. 572 section L: Hypothetical Reference Decoder).

Regarding claim 12, Weigand discloses A video decoder for decoding video signal data for an image slice, the video decoder comprising:

a prediction residual upsampler for upsampling a prediction residual of the image slice (see pg. 562, In-the loop deblocking filtering and pg. 567 Fig. 8, deblocking filter box); and

a combiner for combining the upsampled prediction residual with a predicted reference (see pg. 567 Fig. 8, plus sign);.

Regarding claim 13, the limitations of claim 13 are rejected in the analysis of claim 2, and claim 13 is rejected on that basis.

Regarding claim 17, the limitations of claim 17 are rejected in the analysis of claim 5, and claim 17 is rejected on that basis.

Regarding claim 18, the limitations of claim 18 are rejected in the analysis of claim 6, and claim 18 is rejected on that basis.

Regarding claim 19, the limitations of claim 19 are rejected in the analysis of claim 7, and claim 19 is rejected on that basis.

Regarding claim 20, the limitations of claim 20 are rejected in the analysis of claim 8, and claim 20 is rejected on that basis.

Regarding claim 21, the limitations of claim 21 are rejected in the analysis of claim 9, and claim 21 is rejected on that basis.

Regarding claim 22, the limitations of claim 22 are rejected in the analysis of claim 10, and claim 22 is rejected on that basis.

Regarding claim 23, the limitations of claim 23 are rejected in the analysis of claim 1, and claim 23 is rejected on that basis.

Regarding claim 24, the limitations of claim 24 are rejected in the analysis of claim 2, and claim 24 is rejected on that basis.

Regarding claim 25, the limitations of claim 25 are rejected in the analysis of claim 3, and claim 25 is rejected on that basis.

Regarding claim 26, the limitations of claim 26 are rejected in the analysis of claim 4, and claim 26 is rejected on that basis.

Regarding claim 27, the limitations of claim 27 are rejected in the analysis of claim 5, and claim 27 is rejected on that basis.

Regarding claim 28, the limitations of claim 28 are rejected in the analysis of claim 6, and claim 28 is rejected on that basis.

Regarding claim 29, the limitations of claim 29 are rejected in the analysis of claim 7, and claim 29 is rejected on that basis.

Regarding claim 31, the limitations of claim 31 are rejected in the analysis of claim 9, and claim 31 is rejected on that basis.

Regarding claim 32, Weigand discloses the method as defined in Claim 23, wherein the image slice is divided into macroblocks, and the method further comprises the step of flexibly ordering the macroblocks in response to parameters in a picture parameters set (see pg. 566, 1st paragraph, Sentences 1 and 2).

Regarding claim 33, the limitations of claim 33 are rejected in the analysis of claim 10, and claim 33 is rejected on that basis.

Regarding claim 34, the limitations of claim 34 are rejected in the analysis of claim 12, and claim 34 is rejected on that basis.

Regarding claim 35, the limitations of claim 35 are rejected in the analysis of claim 13, and claim 35 is rejected on that basis.

Regarding claim 36, the limitations of claim 36 are rejected in the analysis of claim 14, and claim 36 is rejected on that basis.

Regarding claim 37, the limitations of claim 37 are rejected in the analysis of claim 15, and claim 37 is rejected on that basis.

Regarding claim 38, the limitations of claim 38 are rejected in the analysis of claim 16, and claim 38 is rejected on that basis.

Regarding claim 39, the limitations of claim 39 are rejected in the analysis of claim 17, and claim 39 is rejected on that basis.

Regarding claim 40, the limitations of claim 40 are rejected in the analysis of claim 18, and claim 40 is rejected on that basis.

Regarding claim 41, the limitations of claim 41 are rejected in the analysis of claim 19, and claim 41 is rejected on that basis.

Regarding claim 43, the limitations of claim 43 are rejected in the analysis of claim 21, and claim 43 is rejected on that basis.

Regarding claim 44, the limitations of claim 44 are rejected in the analysis of claim 22, and claim 44 is rejected on that basis.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weigand in view of Pearlstein et. al (Patent Number: 6,141,456).

Regarding claim 3, Weigand discloses the video encoder as defined in claim 1, Weigand does not disclose the slice prediction residual downsampler applies different downsampling operations for a horizontal direction and a vertical direction of the prediction residual.

Pearlstein et. al from the same or similar fields of endeavor discloses the slice prediction residual downsampler applies different downsampling operations for a horizontal direction and a vertical direction of the prediction residual (see column 6 lns. 46-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to apply different downsampling operations within the slice prediction residual downsampler disclosed by Weigand to provide implementation and cost benefits and to support a wide range of downsampling ratios.

Regarding claim 15, the limitations of claim 15 are rejected in the analysis of claim 3, and claim 15 is rejected on that basis.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weigand view of Shen et al. (US 2003/0161401).

Regarding claim 4, Weigand discloses the video encoder as defined in claim 1. However, Weigand does not disclose the downsampling resolution used in the slice prediction residual downsampler is signaled by parameters in the image slice. Shen et al. from the same or similar fields of endeavor does disclose this limitation (see column 9 para. 3). Shen et al discloses a larger or smaller downsampling operation to be performed as K (the number of input macroblocks in the image slice) increases or decreases. It would have been obvious to one of ordinary skill in the art at the time of the invention to signal the downsampling resolution used in the slice prediction residual downsampler, disclosed by Weigand, by parameters in the image slice, as disclosed by Shen et al. to provide a fast and efficient transcoding method to reduce the load on computational resources and to allow the use of reduced resolutions not just at the slice level, but also at the macroblock level.

Claims 14, and 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Weigand in view of ITU-T Recommendation Draft H.263

Regarding claim 14, Weigand discloses the video decoder as defined in Claim 12, wherein the image slice is divided into macroblocks. Weigand does not disclose the video decoder further comprises Reduced Resolution Update (RRU) mode determining

means connected in signal communication with prediction residual upsampler and responsive to reference indices at a macroblock level for determining whether the video decoder is in an RRU mode, and wherein a prediction residual for a current macroblock is upsampled by said prediction residual upsampler to decode the current macroblock.

The above non disclosed limitation is, however, disclosed in ITU – T Recommendation Draft H.263 (see pg. 31section Q.1). The use of the RRU mode is indicated in the PLUSPTYPE field of the picture header. On the same page of ITU-T Recommendation H.263 in paragraph 3, it is also disclosed that "to produce the final picture, the texture data is decoded at a reduced resolution and then upsampled to the full resolution of the picture". It would have been obvious to one of ordinary skill in the art in the time of the invention to incorporate the Reduced Resolution Update (RRU) mode determining means connected in signal communication with prediction residual upsampler and responsive to reference indices at a macroblock level for determining whether the video decoder is in an RRU mode, and wherein a prediction residual for a current macroblock is upsampled by said prediction residual upsampler to decode the current macroblock, as disclosed in ITU-T Recommendation H.263, within the decoder disclosed in claim 12 by Weigand to provide the opportunity to increase the coding picture rate while maintaining sufficient subjective quality.

Regarding claim 16, Weigand discloses the video decoder as defined in claim 12. Weigand does not disclose the upsampling resolution used in the slice prediction residual upsampler is signaled by parameters in the image slice.

The above non disclosed limitation is, however, disclosed in ITU – T Recommendation H.263 (see pg. 41 section Q.7.2). The parameter STRENGTH defines the strength of the deblocking filter. It would have been obvious to one of ordinary skill in the art the time of the invention to signal the upsampling resolution used by the slice prediction upsampler, which is disclosed by Weigand, by parameters in the image slice, as disclosed in ITU-T Recommendations Draft H.263, to allow the filtering strength to be adjusted to the individual characteristics of the video sequence.

Claims 30 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weigand in view of Ostermann (Signal Processing: Image Communication 9)

Regarding claim 30, Weigand discloses the method as defined in claim 29, Weigand does not disclose the inter prediction is performed using 32x32 macroblocks and 32x32, 32x16, 16x32, and 16x16 macroblock partitions or 16x16, 16x8, 8x16, and 8x8 sub-macroblock partitions.

Ostermann from the same or similar fields of endeavor discloses the inter prediction is performed using 32x32 macroblocks and 32x32, 32x16, 16x32, and 16x16 macroblock partitions or 16x16, 16x8, 8x16, and 8x8 sub-macroblock partitions (see pg. 357 section 5.2.1). Otermann explains that each 32x32 macroblock can be subdivided recursively until a minimum block size of 4x4 pels is reached. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the motion prediction method disclosed by Ostermann within the decoder disclosed by Weigand to provide a picture quality which is perceivably better than the anchor sequences.

Regarding claim 42, the limitations of claim 42 are rejected in the analysis of claim 30, and claim 42 is rejected on that basis.

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Holcomb et. al (US2003/0156648)
- Chujoh et. al (US2010/0239009)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFERY WILLIAMS whose telephone number is (571)270-7579. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on (571)272-7509. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Marsha D. Banks-Harold/
Supervisory Patent Examiner, Art Unit 2482

/JEFFERY WILLIAMS/
Examiner, Art Unit 4163